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1st Named Inventor:		Radka Milanova	
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Title	:	PROTEIN EXTRACTION FROM CANOLA OIL SEED MEAL	
TC./A.U.	:	1656	
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BY COURIER

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
U.S.A.

Dear Sir:

1. Introduction

This Appeal Brief is submitted pursuant to the applicants appeal from the final rejection of the pending claims. This Appeal Brief is submitted in triplicate. Authorization to charge the Appeal Brief fee to our deposit account is enclosed.

2. Extension of Time

Petition is hereby made under the provisions of 37 CFR 1.136(a) for an extension of two months of the period for submitting this Appeal Brief. Authorization to charge the prescribed fee to our deposit account is enclosed.

3. Real Party of Interest

The real party of interest in this application is Burcon Nutrascience (MB) Corp. by virtue of deeds of Assignment dated July 21, 2003, July 22, 2003 and August 5, 2003 respectively by the inventors in respect of the underlying PCT filing.

These assignment papers are of record under Reel/Frame 014643 and 0948 in connection with Application No. 10/465,238, now US Patent 6,992,173, claiming the same priority.

4. Related Appeals and Interferences

There are no prior and pending appeals, interferences or judicial proceedings known to appellant, the appellant's legal representative, or assignee, which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

5. Status of Claims

This application was filed with 50 claims. By amendment, claims 1, 2, 5 to 10, 17 to 19, 25, 29 to 31, 35, 44 to 48 and 50 have been cancelled, claims 51 to 53 added and claims 3, 4, 13 to 16, 20 to 22, 24, 26 to 28, 32, 33 and 36 to 43 have been amended. Claims 3, 4, 12 to 16, 20 to 24, 26 to 28, 32 to 34, 36 to 43, 49 and 51 to 53 are pending and rejected by the Examiner. All rejected claims are appealed herein. A listing of the appealed claims appears in the Claims Appendix.

6. Status of Amendments

An Amendment after Final Action is submitted simultaneously herewith to correct errors in claims 38 and 39. This Amendment has not yet been entered.

7. Summary of Claimed Subject Matter

Claim 3 defines a process of preparing a canola protein isolate comprising a plurality of steps, as follows:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis. (Paragraph [0015] pages 4 to 5; paragraph [0020] line 2, page 6)

In accordance with the embodiment claimed in claim 3, the steps (e) to (j) are effected in a semi-continuous mode of operation (paragraph [0017], line 2, page 5).

Claim 4 is another independent claim directed to the preparation of a canola protein isolate by steps (a) to (j) as specified in claim 3 and set forth above

(see above). In the embodiment of claim 4, the steps (e) to (j) are effected in a continuous mode of operation. (Paragraph [0017], line 3, page 5).

Claim 11 is dependent on claim 4 and defines the process of effecting the extraction step (step (e)), namely:

> (i) continuously mixing said desolventized canola oil seed meal with an aqueous salt solution having an ionic strength of at least 0.10 and a pH of about 5 to about 6.8 at a temperature of about 5° to about 65°C, and (ii) continuously conveying said mixture through a pipe while extracting canola protein from the desolventized canola oil seed meal to form an aqueous canola protein solution having a canola protein content of about 5 to about 40 g/L for a period of time up to 10 minutes. (Paragraph [0028], page 5, paragraphs [0029] and [0030], pages 7 to 8 and paragraph [0035], page 8)

Claims 12 to 16 are each dependent on claim 11 and define preferred ranges of parameters for the extraction step as follows:

- claim 12: the salt solution has an ionic strength of about 0.15 to about 0.8 (paragraph [0026], page 7)

- claim 13: the salt solution has a pH of about 5.3 to about 6.2 (paragraph [0031], page 8)

- claim 14: the concentration of desolventized canola oil seed meal in the aqueous salt solution in the mixing step is about 5 to about 15% w/v (paragraph [0033], page 8)

- claim 15: the extraction temperature is at least 35°C (paragraph [0029], page 8, last two lines)

- claim 16: the aqueous protein solution has a protein content of about 10 to about 30 g/L (paragraph [0038], page 8)

Claim 32 is dependent on claim 4 and recites that the concentrated canola protein solution is continuously mixed with the chilled water to provide a

dilution of the concentrated canola protein solution by about 25 fold or less (paragraph [0050], page 11).

Claims 33 to 34 are dependent, directly or indirectly, on claim 32 and recite preferred parameters of that procedure, as follows:

- claim 33: the chilled water has a temperature of less than 10°C (paragraph [0051], page 12).

- claim 34: the dilution is about 10 fold or less (paragraph [0050], page 11).

Claim 36 is another independent claim directed to the formation of a canola protein isolate by steps (a) to (j) as specified in claim 3 and as set forth above (see above). In the embodiment of claim 36, the canola protein micellar mass has a protein content of at least 100 wt% (N x 6.25) on a dry weight basis (paragraph [0057], page 13).

Claim 20 is a further independent claim directed to the preparation of a canola protein isolate by step (a) to (j) as specified in claim 3 and set forth above (see above). In the embodiment of claim 20, following the separating of the aqueous protein solution from the residual canola oil seed meal (step (f)), the aqueous protein solution is subjected to a pigment removal step (paragraph [0037], page 9).

Claims 21 to 23 are dependent, directly or indirectly, on claim 20 and are directed to specific procedure for effecting the pigment removal step, as follows:

- claim 22: the pigment removal step is effected by diafiltration of the aqueous canola protein solution (paragraph [0037], last two lines).

- claim 23: the pigment removal step is effected by mixing a pigment adsorbing agent with the aqueous canola protein solution and subsequently removing the pigment adsorbing agent from the aqueous canola protein solution (paragraph [0038], page 9).

- claim 24 is dependent on claim 23 and recites that the pigment absorbing agent is powdered activated carbon.

Claim 24 is another independent claim directed to the formation of a canola protein isolate by steps (a) to (j) as specified in claim 3 and set forth above (see above). In the embodiment of claim 24, the desolventized canola oil seed meal is extracted with water and then subsequent thereto salt is added to the resulting aqueous canola protein solution to provide an aqueous canola protein solution having an ionic strength of at least 0.10 (paragraph [0040], page 9).

Claim 26 is a further independent claim directed to the formation of a canola protein isolate by step (a) to (j) as specified in claim 3 and set forth above (see above). In the embodiment of claim 26, the concentration step (step (g)) is effected by ultrafiltration to produce the concentrated protein solution having a canola protein content of at least 250 g/L.

Claim 27 is a further independent claim directed to the formation of a canola protein isolate by step (a) to (j) as specified in claim 3 and set forth above (see above). In the embodiment of claim 27, the concentration step (step (g)) is effected by ultrafiltration to produce a concentrated canola protein solution having a protein concentration of at least 200 g/L and the concentrated canola protein solution is warmed to a temperature of at least 20°C to decrease the viscosity of the concentrated canola protein solution but not beyond a temperature above which the temperature of the concentrated canola protein solution does not permit micelle formation (paragraph [0043], page 10; paragraph [0048], page 11).

Claim 28 is dependent on claim 27 and recites that the concentrated canola protein solution is increased to a temperature of about 25° to about 40°C (paragraph [0048], page 11).

Claim 37 is a further independent claim for the preparation of a canola protein isolate by steps (a) to (j), as specified in claim 3 and as set forth above (see above). In the embodiment of claim 37, following the recovering of the canola protein micellar mass therefrom (step (j)), the supernatant is processed, on a batch, semi-continuous or continuous basis, to recover additional quantities of canola protein isolate therefrom (paragraph [0058], pages 13 and 14).

Claims 38 to 41 and claims 51 to 53 are dependent, directly or indirectly, on claim 37, and define specific features of claim 37, as follows:

- claim 38: the additional quantities of canola protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, and drying the concentrated supernatant (paragraphs [0058] and [0059], page 14).

- claim 39: the additional quantities of canola protein isolate are recovered from the supernatant by concentration the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing the concentrated supernatant with the recovered canola protein micellar mass, and drying the mixture (paragraphs [0058] and [0060], pages 13 and 14).

- claim 40: the additional quantities of canola protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing a portion of the concentrated supernatant with at least a portion of the recovered canola protein micellar mass, and drying the mixture (paragraph [0058], pages 13 to 14 and paragraph [0061], page 14).

- claim 41 is dependent on claim 40 and recites that the remainder of the concentrated supernatant is dried and any remainder of the recovered canola protein micellar mass is dried (paragraph [0061], page 14).

Claims 51 to 53 are respectively dependent on claims 38, 39 and 40 and recite that the supernatant is concentrated to a protein concentration of about 200 to about 300 g/L (paragraph [0058], pages 13 and 14).

Claim 42 is an additional independent claim for the preparation of a canola protein isolate by steps (a) to (j), as specified in claim 3 and as set forth above (see above). In the embodiment of claim 42, as an alternative to the diluting,

settling and recovery steps (steps (h), (i) and (j)), the concentrated canola protein solution is dialyzed to reduce the salt content thereof and to cause the formation of canola protein micelles and a canola protein isolate is recovered from the dialyzed concentrated canola protein isolate having a protein content of 100 wt% (N x 6.25) on a dry weight basis (paragraph [0063], pages 14 and 15).

Claim 43 is dependent on claim 42 and recites that the canola protein isolate recovery (step (j)) is effected by drying the dialyzed concentrated canola protein solution (paragraph [0063], pages 14 to 15).

Claim 49 is another independent claim for the preparation of a canola protein isolate by steps (a) to (j), as specified in claim 33 and as set forth above (see above). In the embodiment of claim 49, the concentration step (step (g)) is effected by ultrafiltration to produce a concentrated canola protein solution having a protein content of at least 200 g/L (paragraph [0043], page 10).

Thus, the present invention is directed to various embodiments, as enumerated above, of a process for the preparation of a canola protein isolate by steps (a) to (j).

8. Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection to be reviewed on appeal are:

(1) Rejection of claims 3 to 4, 11 to 16, 24, 26 to 28, 32 to 34, 36 to 43, 49 and 51 to 53 under 35 USC 103(a) as being obvious over Murray (US 6,005,076) in view of Rossi et al literature reference.

(2) Rejection of claims 20 to 23 under 35 USC 103(a) as being unpatentable over Murray (US 6,005,076) in view of Rossi et al literature reference and in view of Cook et al (US 5,254,673).

9. Argument

(a) Background to the Invention

Canola oil seed is extensively processed for the recovery of canola oil therefrom. The canola oil seed is crushed to remove most of the oil and the residual meal is hot solvent extracted, generally using hexane, to recover the remainder of the oil. The residual meal from the solvent extraction contains residual hexane and is commonly known as "white flake" or less commonly as "marc" meal. The solvent is recovered from the meal for reuse before the oil seed meal is disposed of by the crusher. In the solvent recovery process, the oil seed meal often is heated to a higher temperature of about 120° to 140°C in a procedure termed "toasting". The resulting meal is referred to as "toasted meal" or "high temperature produced meal".

(b) Nature of the Present Invention

As discussed above, the present invention relates to a plurality of specific improvements in an overall process of preparing a canola protein isolate having a protein content of at least 90 wt% (N x 6.25) on a dry weight basis according to steps (a) to (j). For the reasons outlined below, it is submitted that all claims are patentable over the cited combinations of prior art.

In general, it has been found that the amount of protein which can be extracted from the canola oil seed meal can be significantly increased if the extraction is effected on ambient temperature desolventized meal. The ability to extract more protein from the meal improves the overall economics of the process. In addition a product of improved quality is obtained.

(c) Rejection of claims 3 to 4, 11 to 16, 24, 26 to 28, 33 to 34, 36 to 43, 49 and 51 to 53 under 35 USC 103(a) as being unpatentable over Murray in view of Rossi et al.

As the Examiner noted in the Final Action, the applied Murray reference has a common inventor with the present application. The Examiner

indicates that the reference qualifies under 35 USC 102(e) as prior art and that the rejection may be overcome by adopting one of three showings.

However:

(1) The cited Murray reference does not describe the present invention and hence there is no derivation from the inventors of this application,

(2) The cited Murray reference does not describe the present invention and hence there is no showing that can be made of a date of invention of the present application which corresponds to subject matter disclosed but not claimed in the reference,

(3) While the applications are commonly owned, the cited reference does not disclose the subject matter claimed herein and hence the inventor named in this application is not the prior inventor of the subject matter claimed herein.

This application is directed to a process of preparing canola protein isolates by a plurality of steps starting with canola oil seeds. The canola oil seeds are crushed to form canola oil and canola oil seed meal therefrom. Following separation of the canola oil from the canola oil seed meal, the canola oil seed meal is solvent extracted to recover residual canola oil therefrom and then the solvent is removed from the extracted oil seed meal at a temperature of from 15° to 50°C under vacuum to provide a desolventized canola oil seed meal. It is this desolventized canola oil seed meal which is processed to recover the canola protein isolate.

The recovery of the canola protein isolate is effected by extracting the desolventized canola oil seed meal to cause solubilization of canola protein in the desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8. The aqueous canola protein solution is separated from residual canola oil seed meal, following which the aqueous canola protein solution is concentrated while maintaining the ionic strength substantially

constant by using a selective membrane technique to provide a concentrated canola protein solution. The concentrated canola protein solution then is diluted into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles. The canola protein micelles are settled to form an amorphous, sticky, gelatinous, gluten-like protein micellar mass, which is recovered from supernatant, the protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis. The various independent claims define various modifications to this procedure, as set forth below.

As set forth in the disclosure (para 0003), it is common practice in the recovery of canola oil from canola oil seeds to crush the canola oil seeds to remove most of the canola oil and to hot solvent extract the residual meal to recover the remainder of the canola oil. The residual meal from the solvent extraction contains residual solvent, which is recovered from the meal for reuse before the canola oil seed meal is disposed of by the crusher. In the solvent recovery operation, the canola oil seed meal is heated to temperatures of about 120° to 140°C in a procedure called "toasting".

The present invention is based on the surprising discovery that the amount of canola protein which can be extracted from canola oil seed meal can be significantly increased if the solvent recovery is effected on ambient temperature desolventized canola oil seed meal. The ability to extract more canola protein from the meal improves the overall economics of the process. In addition, a product of improved quality is obtained. It is submitted that the Murray et al reference does not describe or suggest the process defined in the rejected claims.

It is conceded that the Murray et al reference describes steps (e) to (j) of the independent claims, with the exception of claim 36, which recites that the canola protein isolate contains at least about 100 wt% protein (N x 6.25) and with the exception of the "wherein" clauses in each step (j). It is submitted that the Murray et al reference does not disclose or suggest the combinations of steps (a) to (d) of the independent claims with steps (e) to (j) and the "wherein" clauses recited therein.

The Examiner referred in the Final Action to Example 3 of Murray et al. This Example illustrates the use of cold pressed extraction of canola seeds in the formation of canola protein isolate. The Example indicates that intact canola seeds were fed into a cold extrusion press and crushed. The compacted seed debris, less extruded oil, was ground in a standard mill to a consistency similar to that of commercial canola meal and then processed by the protein extraction and recovery process described in Example 2 to form a canola protein isolate. In that process (Example 2), a commercial Polish rapeseed meal was processed, first by extracting the meal using an aqueous salt solution, which is the equivalent of step (e) of the independent claims herein, except for claim 24, wherein the extraction is effected using water.

In the Final Action, the Examiner indicated that:

> "According to Murray, the 'canola meal' may be any canola meal resulting from the removal of canola oil from canola seed (col. 2-3, lines 66-2)."

The applicants can agree that Murray makes such a disclosure.

In addition, in the Final Action, the Examiner indicated that:

> "In Example 2, Murray discloses that meal from rapeseed containing 32.5% protein, 10.1% fat and 6.1% moisture was extracted with an aqueous salt solution and agitation (col. 7 lines 37-40). It would be reasonable for one of ordinary skill to recognize that the initial rapeseed meal having a moisture content of 6.1% would be essentially a dried meal product that is desolventized."

Applicants again agree with the Examiner. The Examiner then went on to recite:

> "The aqueous meal/salt solution was mixed for 2 hours at 25°C to remove residual meal and then chilled to 8°C followed by centrifugation (col. 7, lines 5, 40 to 43)."

Again, it is agreed that Example 2 describes such procedure.

The Examiner continued to analyze the disclosure of Murray in the Final Action:

> "Murray discloses the aqueous salt solution with an ionic strength value of less than 0.8 and within the range of 0.3 to 0.6 (col. 8, lines 62-63), a pH range of 5.3 to 6.2 (col. 8, line 66-67), and wherein the aqueous protein solution has a concentration of about 10-100 g/L of protein (col. 9, lines 1-3). In addition, Murray discloses that the formation of protein isolates into micelles is achieved optimally at pH values of 5.3 to 6.2 (col. 3, lines 46-50). After separating the aqueous protein solution from the residual oil seed meal, Murray discloses a process step for increasing the protein concentration using a selective membrane technique, diluting the concentrated protein solution by 15 fold at 6°C to form protein micelles, settling the protein micelles, and recovering the protein mass to provide a dried proteinaceous powder having a protein content of at least 90 wt % (col. 7, lines 12-30, col. 8, lines 31-61)."

It is agreed that these various disclosures are contained in the Murray reference. However, the Examiner also stated in the Final Action:

> "Murray does not explicitly teach a desolventized oil seed meal under vacuum (i.e., the steps of 3(b) and 3(c)) or a continuous mode of operation."

What apparently the Examiner means is that Murray does not explicitly teach the preparation of a desolventized oil seed by using vacuum.

However, reference to step 3(b) and 3(c) appear to be misplaced. Presumably, the Examiner is referring to steps (b) and (c) of claim 3. These steps recite separation of canola oil from canola oil seed meal and solvent extracting the canola oil seed meal to recover residual oil therefrom to produce a solvent extracted canola oil seed meal. Desolventization occurs in step (d), namely removing solvent from the solvent-extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal. Perhaps, the Examiner intended to refer to step 3(d). The steps (a) to (j), including step (d), are recited in each of the independent claims, not just claim 3. Murray does not disclose or suggest the combination of steps (a) to (d) of the independent claims with steps (e) to (j) of these claims.

The Examiner attempted to remedy the shortenings of Murray by reference to Rossi et al. Rossi et al is concerned with a procedure for obtaining a food grade protein meal from defatted sunflower. As noted above, applicants claims are directed to the production of a canola protein isolate by the processing of canola oil seeds, a different oil seed from sunflower seeds.

In the Final Action, the Examiner stated:

> "Rossi et al. disclose that to obtain a protein meal, an initial oil-extraction process is used to obtain a "cake" that is rich in protein. Rossi et al. further disclose a desolventizing under vacuum technology can be performed at 40°C of said cake to obtain a protein meal (p. 309, 310 Figure 1, p. 311 column 2)."

The protein in the "cake" is said to have good nutritional and functional qualities and to be suitable for various applications in the preparation of food formulations. However, it is indicated that the traditional oil extraction techniques on sunflower seeds do not provide cake suitable for human nutrition, owing to heat damage during processing, particularly during pressing and solvent elimination, and high fibre content.

The aim of Rossi et al was:

> "... to determine whether it is possible, after extraction of the oil by an industrial solvent-process, to obtain from the cake a food-grade meal." (page 309, left-hand col., last complete paragraph).

Applicants procedure are directed to the production of a canola protein isolate. The provision of a canola oil seed meal (or "cake") is but an intermediate step in a multi-step operation.

In the Rossi procedure, as seen in Figure 1, on page 310, sunflower seeds are processed by a multi-step operation, with certain samples being taken and processed at various stages of a conventional sunflower seed processing operation. This sample processing, as the Examiner observed, includes vacuum desolventizing of samples B and C at 40°C, sample B being a partly defatted cake

and sample C being a totally defatted cake, the desolventized samples being further subjected to a sieving operation.

Rossi et al provide detailed analysis of the samples and conclude:

> "By replacing the present system's desolventizer-toaster with the desolventizer operating under vacuum, and by adding a mechanical sieving system, it would be possible to produce meals of high protein content and good nutritional value" (page 311, right-hand column, paragraph 2 after the heading "Conclusion").

Thus, to achieve the goal of Rossi et al (i.e. a food-grade meal), it is necessary to not only desolventize the sunflower seed meal under vacuum, but also to effect a sieving operation on the meal. As already noted, the goal of the present invention is different, namely to obtain a canola protein isolate, which does not require any sieving operation to be carried out on the canola oil seed meal.

As discussed above, in the present invention, canola protein isolate is obtained in a higher protein yield than obtained from conventional toasted canola oil seed meal. There is no suggestion in Rossi et al that, in producing a canola protein isolate, increased yields can be obtained by desolventizing canola oil seed meal at a temperature of about 15° to about 50°C under vacuum, as required by applicants claims.

In the Final Action, the Examiner stated:

> "The instant claims are essentially drawn to a process of preparing a protein isolate comprising processing a desolventized oil seed meal. The desolventized oil seed meal is obtained by the process described in claims 3(a)-3(d). The actual process to recover protein isolate from the desolventized oil seed meal is described in claims 3(e)-3(j)."

Independent claim 3 specifically recites that the process steps 3(a) to 3(j) are effected on a semi-continuous basis while independent claim 4 recites that the steps 4(e) to 4(j) are effected on a continuous basis. Claims 13 to 16 are dependent on claim 4 and recites specific process conditions in effecting the canola protein extraction step from the desolventized canola oil seed meal on a continuous basis. Claim 32 is dependent on claim 4 and recites the degree of dilution of a

concentrated canola protein solution in the micelle formation step. Claims 33 and 34 are dependent on claim 32 and recite specific conditions of the dilution step.

In the Final Action, the Examiner asserted that:

> "It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Murray of obtaining a protein isolate by first crushing canola seeds (claim 3a), substituting the oil-extraction process (claim 3b, 3c) and desolventizing under vacuum process (claim 3d) of Rossi et al. to obtain a desolventized oil seed meal and then processing said desolventized oil seed meal to obtain a protein isolate by extracting said desolventized oil seed meal to cause solubilization and to form an aqueous protein solution having a pH of about 5-6.8, maintain the aqueous solution at an ionic strength and pH range that is suitable for the formation of protein micelles (claims 3-4, 11-16, 24, 32-34, 36-37), increase the protein concentration (claim 3), dilute the concentrated protein solution to induce the formation of protein micelles (claim 3-4, 11-16, 24, 32-34, 36-37), settle the protein micelles, and recover the protein micelles to make a dry proteinaceous powder having a protein content of at least 90 wt % (claim 3-4) because Murray provides and suggests motivation for a method of preparing a protein isolate from a desolventized oil seed meal and Rossi et al. teach a desolventized oil seed meal under vacuum."

In effect, the Examiner appears to modify the specific teachings of Murray to obtain a canola protein isolate from canola oil seed meal by adding steps (a) to (d) to the Murray process. While, as indicated earlier, Murray describes in col. 2 to 3, ll. 66-2 that:

> "The canola meal may be any canola meal resulting from the removal of canola oil from canola seed with varying levels of the non-denatured protein, resulting, for example, from hot hexane extraction or cold extrusion materials."

this statement provides no suggestion to effect desolventization of solvent-extracted canola oil seed meal under vacuum at a temperature of about 15° to 50°C, to obtain the benefits of improved extractability and improved quality of isolate.

The teachings of Rossi with respect to desolventization are to be taken in the context of the document as a whole. As already discussed, the Rossi et al

procedure is directed to sunflower seeds and is specifically concerned with the provision of a sunflower oil seed meal (or "cake") which is a food-grade meal. The Rossi et al reference is silent as to any potential further processing of the meal to form a protein isolate. Therefore, a person skilled in the art would not be motivated to consider the Rossi et al teaching of the processing of sunflower seeds to obtain a food-grade meal as a alternative procedure to obtaining a canola oil seed meal for the Murray et al process. In addition, a person skilled in the art would not be motivated by Rossi et al to consider that an improved yield of canola protein isolate would be obtained by desolventizing canola oil seed meal under vacuum at a temperature of 15° to 50°C, as claimed herein.

The Examiner analyzed specific ones of the claims in the Final Action. Thus, the Examiner stated:

> "Murray does not specifically disclose that steps (e) to (j) of claims 3-4 are effected in a semi-continuous or continuous mode of operation.
>
> "However, it would have been obvious to one of ordinary skill in the art at the time of the invention, for the steps of (e) through (j) of the process of making a canola protein isolates as taught by Murray, to have been effected in a continuous mode of operation in order to increase the efficiency and overall production capacity of the system. One of ordinary skill in the art would have been motivated to make the process of Murray run in a continuous or semi-continuous mode in order to achieve the maximum efficiency of the production system, thereby increasing production of said protein isolate and increasing financial returns."

The Examiner is correct that Murray et al do not disclose operation of the steps (e) to (j) on a semi-continuous or continuous basis. In any event, claims 3 and 4 are distinguished from the combination of Murray et al and Rossi et al in view of the defects of Rossi et al referred to above.

The Examiner further states in the Final Action:

> "Regarding claims 24, 42-43 (i.e. salt is subsequently added to the resulting aqueous protein solution to provide an aqueous protein solution having an ionic strength of at least 0.10), it should be noted since Murray discloses that extracting canola oil seed meal is effected using an aqueous salt solution having an ionic strength of at least 0.2

> and a pH of about 5-6 (col. 3 lines 9-11, lines 40-41), it is believed that salt is added to the water at some point during the extraction process."

In this regard, only claim 24 recites the step of extracting with water and subsequently adding salt to the extracted canola protein isolate. The Examiner's comments with respect to claims 42 to 43 are discussed below.

The Examiner is correct that the Murray et al reference describes extracting oil seed meal with aqueous salt solution having an ionic strength of at least 0.2 and pH of about 5 to 6.8, and indeed in Example 1, specifically directed to preparation of a canola protein isolate, the canola oil seed meal is extracted with a 0.5 M solution of sodium chloride made from tap water. However, it is submitted that this teaching does not disclose or suggest the two-step procedure defined in claim 24 for forming the aqueous canola protein solution which is subjected to the concentration step, in which the canola oil seed meal is first extracted with water to form an aqueous canola protein solution and then salt is added to the latter solution to an ionic strength of at least 0.1 to form the aqueous canola protein solution for concentration.

With respect to claims 42 to 43, these claims define, as an alternative procedure of the diluting, settling and recovering steps ((h) to (j)), that the concentrated canola protein solution is dialyzed to reduce the salt content thereof and to cause the formation of canola protein micelles and canola protein isolate is recovered from the dialyzed concentrated canola protein solution. In the Final Action, the Examiner stated:

> "In this instance, it would be reasonable for one ordinary skill to know that the addition of salt to an aqueous solution would also require a dialyzing step in order to eliminate the salt from the concentration protein solution (claims 42-43)."

However, it is clear that Murray et al contains no suggestion to modify the procedure for micelle formation therein by dialyzing the concentrated canola protein solution to reduce the salt content and thereby cause the formation of canola protein micelles and recovering the canola protein micelles as the canola protein isolate from the dialyzed concentrated canola protein solution.

The Examiner continued the analysis in the Final Action of the claims in stating:

> "Regarding claims 27-28 (i.e., said concentrated protein solution is warmed to a temperature of at least 20°C), Murray discloses the concentration of the protein solution may be effected at any convenient temperature, i.e. 20°C to 45°C (col. 4 lines 66-67 to col. 5 lines 1-5). Therefore, it would be reasonable for one of ordinary skill to be motivated to determine which conditions will yield the highest protein concentration in order to obtain a protein isolate with the highest protein content."

While the Murray reference refers to effecting concentration of the canola protein solution at a temperature of 20° to 45°C, it is not apparent that this teaches that the viscosity of the concentrated protein solution may be reduced by warming to a temperature of at least 20°C, preferably about 25° to about 40°C, but not to a temperature above which the temperature does not permit micelle formation.

In the Final Action, the Examiner stated:

> "Regarding claims 38-41, 51-53 (i.e., recovering additional quantities of protein isolate from the supernatant by concentrating the supernatant to a protein concentration of about 100 to 400 g/L), as noted above, Murray discloses increasing the protein concentration; therefore, it would be reasonable for one of ordinary skill to determine at which protein concentration the supernatant should be at (i.e. greater than 100 g/L, 200 g/L, etc.) in order to recover a protein micellar mass that will yield a protein isolate with the highest protein content."

While it is correct that Murray discloses "increasing the protein concentration", this teaching is with respect to the aqueous protein solution resulting from extraction of the oil seed meal and <u>not</u> with respect to the supernatant from canola protein micelle formation as in claims 38 to 41 and 51 to 53. This concentration step is effected in Murray prior to formation of the canola protein micelles. The Murray et al reference is entirely silent as to the supernatant from the canola micelle formation and potential processing thereof and presumably this is discarded. In any event, there is no suggestion that the supernatant may contain

additional recoverable quantities of canola protein and that such canola protein can be recovered in the form of an isolate.

The discussion above with respect to the patentability of the claims tracks the discussion contained in the prior Amendment. In the Final Action, the Examiner commented on some of these submissions with respect to the combination of Murray with Rossi and applicants arguments with respect thereto. The Examiner stated:

> "Firstly, it should be noted that Murray discloses that his process can be applied to other oil seeds (i.e. soybeans), and not just to canola seed. It is well known in the art that soybeans, canola seeds, and sunflower seeds are all oil-bearing seeds that can be refined and de-oiled (evidenced by Dahlke 1998 Chem Eng Technol 21(3): 278-281). Therefore, it would be reasonable for one of ordinary skill to know that the process of Murray is applicable to oil-bearing seeds in general, including sunflower, soybean, and canola."

The Examiner is correct that Murray describes that his process can be applied to other oil seeds. However, this is irrelevant, since applicants claims are limited to canola and not generally directed to oil seeds. The Examiner is also correct the soybean, canola seed and sunflower seeds are all oil-bearing seeds that can be refined and de-oiled. Again, this is irrelevant since applicants claims are specifically directed to the production of canola protein isolate from canola oil seeds.

The Examiner further commented in the Final Action:

> "Murray discloses that the seed meal (the de-oiled seed) results from the removal of oil from the seed, for example by hot hexane extraction or cold oil extrusion methods (col. 2 line 66 to col. 3 line 3)."

The applicants concede that the canola oil seed meal that is the starting point of the Murray process originates as canola oil seeds. What is missing from Murray is any mention of a desolventization step under the conditions recited in step (d) of applicants independent claims.

With respect to Rossi, the Examiner commented that:

> "Rossi et al. disclose that traditional oil extraction techniques do not provide cake (or meal) suitable for protein nutrition (Rossi et al. p. 309). The seed meal has poor nutritional qualities because of high fiber content and may suffer from heat damage during processing. Therefore, Rossi et al. have disclosed that using a low-temperature desolventizer operating under vacuum can produce a seed meal that is suitable for nutritional consumption and of high structural quality (Rossi et al. p. 309)."

It is submitted that the Examiner has oversimplified the teachings of Rossi. First of all, as discussed above, the Rossi procedure is directed specifically to sunflower seeds and the attainment of an improved sunflower seed meal. Second, the procedure requires, as discussed above, does not involve simply the low-temperature desolventization procedure but also requires a sieving operation. There is no suggestion in Rossi that the result of high protein content and good nutritional value could be obtained without the sieving step.

The Examiner went on to state:

> "Since Murray discloses a process for obtaining a protein isolate from the meal of an oil-bearing seed and Rossi et al. further disclose the advantages of using a low-temperature desolventizer operating under vacuum to obtain meal from an oil-bearing seed, it would be reasonable for one of ordinary skill to substitute the oil extraction and low-temperature desolventizing under vacuum step of Rossi et al. for the general oil removing steps disclosed by Murray. Since canola seeds and sunflower seeds are both oil-bearing seeds, it would be reasonable for one of ordinary skill to know that the steps used to process any oil-bearing seed would overlap in scope and that the steps used to process one type of oil-bearing seed would be applicable to another oil-bearing seed since said oil-bearing seeds have always been processed to obtain oil, meal, and protein."

While, as conceded above, Murray describes the application of their process to a variety of oil seeds, Rossi is clearly limited to sunflower seed and apparent problems in the conventional procedure for obtaining meal from sunflower seeds. There is nothing in either reference to suggest that, when canola oil seeds are processed, desolventization under vacuum at 15° to 50°C would lead to improved extractability of canola protein from canola oil seed meal.

With respect to the essential requirement for a sieving step in Rossi to obtain the desired sunflower seed meal, the Examiner commented in the Final Action:

> "It should be noted that the use of open claim language "comprising" allows for the inclusion of additional steps and components in the claims. Therefore, even if Rossi et al. disclose an additional sieving operation to be carried out on the oil seed meal, said sieving operation does not interfere with obtaining the oil seed meal."

But the sieving step is entirely necessary to obtaining the desired product in Rossi. To ignore this essential step of Rossi, is to alter the essential character of the teaching of Rossi, that both a desolventization step at 40°C and a sieving step are required to obtain the desired product. To repeat an earlier quotation from Rossi:

> "By replacing the present system's desolventizer-toaster with the desolventizer operating under vacuum and by adding a mechanical sieving system, it would be possible to produce meals of high protein content and good nutritional value." (emphasis added)

It is apparent that a sieving system is essential.

Finally, the Examiner stated:

> "Regarding Applicants' remarks that the goal of the present invention is different, it should be noted that the instant process recites preparing canola protein isolate from canola oil seed meal. Murray discloses that to obtain a canola protein isolate, the canola seeds have to be treated in order to obtain canola seed meal. Since Rossi et al. disclose the advantages of preparing a seed meal, it would be reasonable for one of ordinary skill to apply the teachings of Rossi et al. to obtain a seed meal that can then be further processed downstream to obtain a protein isolate. One of ordinary skill would know that the seed meal is the starting material from which the protein isolate is obtained from and since Rossi et al. disclose an advantage to obtaining seed meal by using a low-temperature desolventizer operating under vacuum step versus the general steps known in the an, then it would be reasonable for one of ordinary skill to combine the teachings of Murray and Rossi et al. for obtaining protein isolates from an oil-bearing seed, i.e. canola, soybean, etc."

It is believed that this position has been fully discussed and rebutted above.

Accordingly, it is submitted that the Examiner is in error in rejecting claims 3 to 4, 11 to 16, 24, 26 to 28, 32 to 34, 36 to 43, 49 and 51 to 53 under 35 USC 103(a) as being obvious over Murray in view of Rossi.

(d) Rejection of claims 20 to 23 under 35 USC 103(a) as being unpatentable over Murray in view of Rossi et al in view of cook et al.

Claims 20 to 23 relate to the provision of the additional step of subjecting the aqueous canola protein solution to a pigment removal step following separation of the aqueous canola protein solution from the residual canola oil seed meal and prior to the concentration step.

The relevance of the combination of Murray and Rossi et al to the basic combination of steps and the distinctions thereover has been discussed above. It is submitted that the Cook et al reference does not remedy these defects.

The Examiner relied on Cook for the teaching that:

> "Cook et al. disclose a process for zein protein purification from corn meal. Cook et al. disclose that activated carbon powder can be used to further purify said protein from meal (col. 9 example 2)."

Cook et al describe a purification procedure for the recovering the zein (maize) from corn gluten meal involving a multiple step operation. As the Examiner states, Examples of Cook et al describe the use of powdered activated carbon in one step of this multiple step operation for purification of the zein.

The Examiner asserted in the Final Action:

> "It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Murray in view of Rossi et al. by adding in the step of incorporating activated carbon powder as suggested by Cook et al. in order to obtain a protein isolate from the canola seed meal (claims 20-23). The motivation to do so is given by Cook et al. which disclose that activated carbon powder can be incorporated into a protein processing method in order to better purify the protein isolate that is obtained from a seed meal."

Cook is concerned with zein and not canola. Contrary to the Examiner's position, Cook et al does not provided a general teaching that powdered activated carbon can be incorporated into a protein processing method for pigment removal.

Accordingly, it is submitted that the Examiner has erred in rejecting claims 20 to 23 under 35 USC 103(a) as being unpatentable over Murray in view of Rossi et al and further in view of Cook et al.

(e) Patentability of Subsidiary Claims

(i) Claims 11 to 16

With respect to claims 11 to 16, which are dependent on claim 4, it is submitted that the specific combination of process conditions recited in claim 11 for extraction of the canola protein from the desolventized canola oil seed meal in a continuous process is not found in Murray et al.

(ii) Claim 24

With respect to claim 24, Murray et al does not disclose a procedure in which desolventized canola oil seed meal is extracted with water and salt is added to the aqueous canola protein solution produced thereby to remove an ionic strength of at least 0.1.

(iii) Claim 36

With respect to claim 36, Murray et al does not disclose a procedure in which a canola protein isolate having a protein content of at least 100 wt% (N x 6.25) d.b. is obtained. In the only specific information provided in Murray et al with respect to protein content of a canola protein isolate (see Example 1), the protein content is given as 91 wt%.

(iv) Claim 37

With respect to claim 37, there is no disclosure in Murray et al of processing supernatant from the deposition of canola protein micelles to recover additional quantities of canola protein isolate.

10. Conclusion

Having regard to the contents of this Appeal Brief, it is submitted that:

(a) the rejection of claims 3 to 4, 11 to 16, 24, 26 to 28, 32 to 34, 36 to 43, 49 and 51 to 53 under 35 USC 103(a) as being obvious over Murray in view of Rossi et al, and

(b) the rejection of claims 20 to 23 under 35 USC 103(a) as being unpatentable over Murray in view of Rossi et al in view of Cook et al,

should be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

3. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said steps (e) to (j) are effected in a semi-continuous mode of operation.

4. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said steps (e) to (j) are effected in a continuous mode of operation.

11. The process of claim 4 wherein said extraction step is effected by:

(i) continuously mixing said desolventized canola oil seed meal with an aqueous salt solution having an ionic strength of at least 0.10 and a pH of about 5 to about 6.8 at a temperature of about 5° to about 65°C, and

(ii) continuously conveying said mixture through a pipe while extracting canola protein from the desolventized canola oil seed meal to form an aqueous canola protein solution having a canola protein content of about 5 to about 40 g/L for a period of time up to 10 minutes.

12. The process of claim 11 wherein said salt solution has an ionic strength of about 0.15 to about 0.8.

13. The process of claim 11 wherein the salt solution has a pH of about 5.3 to about 6.2.

14. The process of claim 11 wherein the concentration of said desolventized canola oil seed meal in said aqueous salt solution in said mixing step is about 5 to about 15% w/v.

15. The process of claim 11 wherein said temperature is at least 35°C.

16. The process of claim 11 wherein said aqueous protein solution has a protein content of about 10 to about 30 g/L.

20. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein, following said separating of the aqueous canola protein solution from the residual canola oil seed meal, the aqueous canola protein solution is subjected to a pigment removal step.

21. The process of claim 20 wherein said pigment removal step is effected by diafiltration of the aqueous canola protein solution.

22. The process of claim 20 wherein said pigment removal step is effected by mixing a pigment adsorbing agent with the aqueous canola protein solution and subsequently removing the pigment adsorbing agent from the aqueous canola protein solution.

23. The process of claim 22 wherein the pigment adsorbing agent is powdered activated carbon.

24. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said desolventized canola oil seed meal is extracted with water and subsequent thereto salt is added to the resulting aqueous canola protein solution to provide an aqueous canola protein solution having an ionic strength of at least 0.10.

26. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to produce the concentrated protein solution having a canola protein content of at least 250 g/L.

27. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to produce a concentrated protein solution having a protein content of at least 200 g/L and wherein said concentrated canola protein solution is warmed to a temperature of at least 20°C to decrease the viscosity of the concentrated canola protein solution but not beyond a temperature above which the temperature of the concentrated canola protein solution does not permit micelle formation.

28. The process of claim 27 wherein said concentrated canola protein solution is warmed to a temperature of about 25°C to about 40°C.

32. The process of claim 4 wherein said concentrated canola protein solution is continuously mixed with said chilled water to provide a dilution of the concentrated canola protein solution by about 15 fold or less.

33. The process of claim 32 wherein said chilled water has a temperature of less than 10°C.

34. The process of claim 33 wherein said dilution is by about 10 fold or less.

36. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the canola aqueous protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a protein content of at least 100 wt% (N x 6.25) on a dry weight basis.

37. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the aqueous canola protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein, following recovering of the canola protein micellar mass therefrom, the supernatant is processed, on a batch, semi-continuous or continuous basis, to recover additional quantities of canola protein isolate therefrom.

38. The process of claim 37 wherein said additional quantities canola of protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, and drying the concentrated supernatant.

39. The process of claim 37 wherein said additional quantities canola of protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing the concentrated supernatant with the recovered canola protein micellar mass, and drying the mixture.

40. The process of claim 37 wherein said additional quantities of canola protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing a portion of said concentrated supernatant with at least a portion of the recovered canola protein micellar mass, and drying the resulting mixture.

41. The process of claim 40 wherein the remainder of the concentrated supernatant is dried and any remainder of the recovered canola protein micellar mass is dried.

42. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the canola aqueous protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein, as an alternative to said diluting, settling and recovering steps, the concentrated canola protein solution is dialyzed to reduce the salt content thereof and to cause the formation of canola protein micelles, and a canola protein isolate is recovered from the dialyzed concentrated canola protein

solution having a protein content of at least 100 wt% (N x 6.25) on a dry weight basis.

43. The process of claim 42 wherein said canola protein isolate recovery is effected by drying the dialyzed concentrated canola protein solution.

49. A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(d) removing solvent from the extracted canola oil seed meal at a temperature of about 15° to about 25°C under vacuum to provide a desolventized canola oil seed meal,

(e) extracting the desolventized canola oil seed meal to cause solubilization of protein in said desolventized canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(f) separating the canola aqueous protein solution from residual canola oil seed meal,

(g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to

produce a concentrated canola protein solution having a protein content of at least 200 g/L.

51. The process of claim 38 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.

52. The process of claim 39 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.

53. The process of claim 40 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.